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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/535,403	05/18/2005	Nobuo Kobayashi	123928	5897

25944 7590 03/14/2006

OLIFF & BERRIDGE, PLC  
P.O. BOX 19928  
ALEXANDRIA, VA 22320

EXAMINER
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RODELA, EDUARDO A

ART UNIT	PAPER NUMBER
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2826

DATE MAILED: 03/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/535,403

Applicant(s)

KOBAYASHI, NOBUO

Examiner

Eduardo A. Rodela

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☒ Claim(s) 7 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

*Minhloan Tran*  
**Minhloan Tran**  
**Primary Examiner**  
**Art Unit 2826**

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 9/19/2005.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

***Priority***

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3, 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Nishizawa et al. (US 5,355,235).

Regarding claim 1, Nishizawa et al. disclose in Figure 6, a field-effect transistor comprising:

- a gate electrode [12] formed at one side a base substrate;
- a source electrode [14] formed at the one side of the base substrate;
- a drain electrode [15] formed at the one side of the base substrate [drain electrode 24];
- an insulation layer [13] formed between the gate electrode and the source electrode and between the gate electrode and the drain electrode;
- a semiconductor layer [16] formed around the source electrode and the drain electrode; and

a functional layer provided so as to come into contact with the semiconductor layer and containing electron acceptors [13 second organic semiconductor layer, column 4: lines 19-45, states "the second organic layer has a carrier concentration different from that of the first organic layer" and "...examples of the dopant (in the second organic layer) are halogens (e.g. I<sub>2</sub>, Cl<sub>2</sub>, Br<sub>2</sub>, ICl, ICl<sub>3</sub>, IBr, and IF)"].

Regarding claim 2, Nishizawa discloses the field-effect transistor according claim 1, wherein the electron acceptor has a half-wave reduction potential -0.46 V or higher [13 second organic semiconductor layer, column 4: lines 19-45, states "the second organic layer has a carrier concentration different from that of the first organic layer" and "...examples of the dopant (in the second organic layer) are halogens (e.g. I<sub>2</sub>, Cl<sub>2</sub>, Br<sub>2</sub>, ICl, ICl<sub>3</sub>, IBr, and IF)"].

Regarding claim 3, Nishizawa et al. discloses the field-effect transistor according to claim 1, wherein electron acceptor is a pi-conjugate molecule composed of an ethylene molecule [column 3: line 65 to column 4: line 11, "materials for a first organic layer constituting a channel and a second organic layer formed to be adjacent to the channel, a pi conjugated polymer...Examples of the pi conjugated polymer are ... polydiacetylene"].

Regarding claim 5, Nishizawa et al. disclose the field effect transistor according to claim 1, wherein the thickness of the functional layer is 0.5 to 500 nm [column 8: lines 38-41].

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishizawa et al. in view of Afzali-Ardakani et al. (US 6,963,080).

Regarding claim 4, Nishizawa et al. discloses the field-effect transistor according to claim 3. Nishizawa et al. does not specify the organic layer constituent details wherein the pi-conjugate structure has a carbon number of 3- to 15 and in which a heterocycle including an S atom as a heteroatom is formed. Afzali-Ardakani et al. disclose the organic layer constituent details wherein the pi-conjugate structure has a carbon number of 3- to 15 and in which a heterocycle including an S atom as a heteroatom is formed [column 4: lines 36-65, speaking of the organic layer, "1-12 Carbon atoms" and "at least one of X and Y is a hetero atom selected from: N, O and S."]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the material of Nishizawa et al. have the specified constituents taught by Afzali-Ardakani et al. The ordinary artisan would have been motivated to do so in order to provide solvent soluble materials which require less expensive patterning / manufacturing schemes.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishizawa et al. in view of Bai et al. (US 2004/0222412).

Regarding claim 6, Nishizawa et al. disclose the field effect transistor according to claim 1. Nishizawa et al. do not disclose dimensions wherein the functional layer satisfies the following expression (1);  $D2 * 0.001 \leq d1 \leq d2 * 1 \dots (1)$ , Where  $d1$  denotes the thickness of the insulation layer. Bai et al. does disclose dimensions wherein the functional layer satisfies the following expression (1);  $D2 * 0.001 \leq d1 \leq d2 * 1 \dots (1)$ , Where  $d1$  denotes the thickness of the insulation layer [Fig. 1: organic layer 18 and dielectric 16, paragraph 0044 discloses the dimensions of the dielectric layer, paragraph 0084 discloses the dimension of the dielectric layer, an almost satisfies the equation where  $0.4 \text{ Angstroms} \leq 500 \text{ Angstroms} \leq 400 \text{ Angstroms}$ ]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Nishizawa et al. with the teachings of Bai et al. and to further thin the gate dielectric so that the relative thicknesses of the organic layer be equal or larger than that of the dielectric layer. The ordinary artisan would have been motivated to do so in order to provide higher performance thin film transistors, since current flow in the field effect transistor is inversely proportional to the gate dielectric thickness, so the thinner the gate the faster the device.

***Allowable Subject Matter***

Claim 7 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art of record, and more specifically Nishizawa et al. do not show the specified concentration of acceptors contained in the functional layer.

***Fax / Telephone Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eduardo A. Rodela whose telephone number is (571) 272-8797. The examiner can normally be reached on M-F, 9:00AM-5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272-1915. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Eduardo A. Rodela  
Examiner

